

## WHAT IS CLAIMED IS:

1           1.    A system for providing a scalable objective metric for  
2   evaluating video quality of a video image, said system comprising:  
3           an objective metric controller capable of receiving a  
4   plurality of objective metric figures of merit from a plurality of  
5   objective metric model units, and capable of determining said  
6   scalable objective metric from said plurality of objective metric  
7   figures of merit, wherein at least one pair of said plurality of  
8   metric model units is interdependent.

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1           2.    The system for providing a scalable objective metric for  
2   evaluating video quality of a video image as claimed in Claim 1  
3   wherein the number of said plurality of objective metric figures of  
4   merit may vary from two to N, where N is an integer number.

1           3.    The system for providing a scalable objective metric for  
2   evaluating video quality of a video image as claimed in Claim 1  
3   wherein said objective metric controller is capable of determining  
4   said scalable objective metric from a correlation factor derived  
5   from a mathematical description of an interdependency of said at  
6   least one interdependent pair of said plurality of metric model  
7   units.

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1        5.    The system for providing a scalable objective metric for  
2    evaluating video quality of a video image as claimed in Claim 1  
3    comprising a weighting unit that assigns weight values to each of a  
4    plurality of non-interdependent objective metric figures of merit  
5    by using a correlation factor,  $r(i)$ , for each of said objective  
6    metric figures of merit, where each correlation factor,  $r(i)$ , for  
7    an objective metric figure of merit represents how well the  
8    objective metric figure of merit evaluates video image  
9    characteristics.

10       6.    The system for providing a scalable objective metric for  
11    evaluating video quality of a video image as claimed in Claim 1  
12    wherein said plurality of objective metric model units comprises at  
13    least one objective metric model unit for a desirable video image  
14    feature and at least one objective metric model unit for an  
15    undesirable video image feature.

1        7.    The system for providing a scalable objective metric for  
2    evaluating video quality of a video image as claimed in Claim 5  
3    wherein said objective metric controller calculates a value,  $F$ , for  
4    said scalable objective metric from interdependent objective  
5    metrics using a mathematical description of interdependencies of  
6    said interdependent objective metrics.

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10        8.    The system for providing a scalable objective metric for  
20    evaluating video quality of a video image as claimed in Claim 5  
30    wherein said objective metric controller is capable of calculating  
40    a plurality of sums for a plurality of non-interdependent objective  
50    metrics where each sum,  $S(r(i))$ , is equal to the sum of each  
60    product of weight value,  $w(i)$ , and figure of merit,  $f(i)$ , for each  
70    of said correlation factors,  $r(i)$ .

1        9.    The system for providing a scalable objective metric for  
2    evaluating video quality of a video image as claimed in Claim 8  
3    wherein said objective metric controller is capable of obtaining  
4    said scalable objective metric by selecting said scalable objective  
5    metric to be the maximum value of the plurality of sums,  $S(r(i))$ ,  
6    where said maximum value represents the best correlation of  
7    objective metric measurements of said video image with subjective  
8    measurements of said video image.

9        10.   The system for providing a scalable objective metric for  
10   evaluating video quality of a video image as claimed in Claim 1  
11   wherein said objective metric controller is capable of continually  
12   determining a new value of said scalable objective metric from new  
13   values of said plurality of objective figures of merit as said  
14   plurality of objective metric model units continually receive new  
15   video images.

11. The system for providing a scalable objective metric for evaluating video quality of a video image as claimed in Claim 1 wherein said objective metric controller is capable of adding at least one objective metric to said plurality of objective figures of merit, and wherein said objective metric controller is capable of deleting at least one objective metric from said plurality of objective figures of merit.

12. The system for providing a scalable objective metric for evaluating video quality of a video image as claimed in Claim 1 wherein said objective metric controller comprises:

a controller capable of receiving a plurality of objective metric figures of merit,  $f(i)$ , from a plurality of objective metric model units; and

a metric calculation algorithm contained within a memory coupled to said controller, said metric calculation algorithm containing instructions capable of being executed by said controller to determine a value,  $F$ , for said scalable objective metric from a weighted average of said plurality of objective metric figures of merit,  $f(i)$ , wherein at least one pair of said plurality of objective metric model units is interdependent.

1        13. The system for providing a scalable objective metric for  
2        evaluating video quality of a video image as claimed in Claim 1  
3        comprising:

4        a plurality of objective metric model units wherein at least  
5        one pair of said plurality of objective metric model units is  
6        interdependent;

7        an objective metric controller capable of receiving a  
8        plurality of objective metric figures of merit from said plurality  
9        of objective metric model units, wherein said objective metric  
10       controller is capable of determining a value,  $F$ , for said scalable  
11       objective metric from a plurality of non-interdependent objective  
12       metric figures of merit,  $f(i)$ , and capable of determining a value,  
13        $F$ , for said scalable objective metric from at least two  
14       interdependent objective metrics, wherein said value  $F$  represents  
15       an objective metric that represents a maximum level of correlation  
16       of objective metric measurements of video quality and subjective  
17       measurements of video quality.

1        14. A method for providing a scalable objective metric for  
2        evaluating video quality of a video image comprising the steps of:  
3        receiving in an objective metric controller a plurality of  
4        objective metric figures of merit from a plurality of objective  
5        metric model units wherein at least one pair of said plurality of  
6        objective metric model units is interdependent; and  
7        determining said scalable objective metric from said plurality  
8        of said objective metric figures of merit.

9        15. The method for providing a scalable objective metric for  
10       evaluating video quality of a video image as claimed in Claim 14  
11       wherein the step of determining said scalable objective metric from  
12       said plurality of said objective metric figures of merit comprises  
13       the step of:

14       determining said scalable objective metric from a correlation  
15       factor derived from a mathematical description of an  
16       interdependency of said at least one interdependent pair of said  
17       plurality of said objective metric model units.



1        16. The method for providing a scalable objective metric for  
2        evaluating video quality of a video image as claimed in Claim 14  
3        wherein the step of determining said scalable objective metric from  
4        said plurality of said objective metric figures of merit comprises  
5        the step of:

6        determining said scalable objective metric from a correlation  
7        factor derived using a neural network algorithm that employs both  
8        objective quality sources and subjective quality sources.

9        17. The method for providing a scalable objective metric for  
10       evaluating video quality of a video image as claimed in Claim 14  
11       further comprising the steps of:

12       assigning weight values to each of said plurality of objective  
13       metric figures of merit by using a correlation factor,  $r(i)$ , for  
14       each of a plurality of non-interdependent objective metric figures  
15       of merit, where each correlation factor,  $r(i)$ , for an objective  
16       metric figure of merit represents how well the objective metric  
17       figure of merit evaluates video image characteristics.

1        18. The method for providing a scalable objective metric for  
 2        evaluating video quality of a video image as claimed in Claim 14  
 3        wherein said plurality of objective metric model units comprises at  
 4        least one objective metric model unit for a desirable video image  
 5        feature and at least one objective metric model unit for an  
 6        undesirable video image feature.

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19. The method for providing a scalable objective metric for  
 evaluating video quality of a video image as claimed in Claim 14  
 further comprising the steps of:

receiving in said objective metric controller new values of  
 said plurality of objective metric figures of merit from said  
 plurality of objective metric model units as said plurality of  
 objective metric model units receive new video images; and

continually determining a new value of said scalable objective  
 metric from said new values of said plurality of objective metric  
 figures of merit.

1        20. The method for providing a scalable objective metric for  
2        evaluating video quality of a video image as claimed in Claim 14  
3        further comprising the steps of:

4        determining a weight value,  $w(i)$ , for each of said plurality  
5        of objective metric figures of merit;

6        keeping said weight values constant; and

7        calculating said scalable objective metric using said constant  
8        weight values.

9        21. A method for providing a scalable objective metric for  
10        evaluating video quality of a video image comprising the steps of:

11        receiving in an objective metric controller a plurality of  
12        objective metric figures of merit from a plurality of objective  
13        metric model units wherein each of said plurality of objective  
14        metric model units is independent; and

15        determining said scalable objective metric from said plurality  
16        of said objective metric figures of merit from a correlation factor  
17        derived using a neural network algorithm that employs both  
18        objective quality sources and subjective quality sources.